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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,381	12/04/2003	Gopakumar Parameswaran	CIS0203US	7407

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EXAMINER	
NORRIS, JEREMY C	

ART UNIT	PAPER NUMBER
2841	

DATE MAILED: 09/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/727,381	PARAMESWARAN ET AL.	
	Examiner	Art Unit	
	Jeremy C. Norris	2841	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 11, 12, 20-24, 28-34, and 38-44 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,641,411 B1 (Stoddard).

Stoddard discloses, referring primarily to figure 2, a printed circuit board, comprising: a substrate (201); a first pair of vias (203) in the substrate; and a second pair of vias (205) in the substrate; wherein the first pair of vias is configured to convey a first signal pair and the second pair of vias is configured to convey a second signal pair (col. 2, lines 1-15); the first pair of vias is positioned in a first plane, each point in the first plane is substantially equidistant from each via in the second pair of vias, the second pair of vias is positioned in a second plane, each point in the second plane is substantially equidistant from each via in the first pair of vias (figure 2) [claim 1], wherein the first signal pair is a first differential signal pair, and the second signal pair is a second differential signal pair (col. 2, lines 1-15) [claim 2], a plurality of Ball Grid Array (BGA) connectors (col. 3, lines 5-10), wherein each via in the first pair of vias and the second pair of vias is coupled to a respective one of the plurality of BGA connectors

[claim 3], further comprising: a first differential signal source coupled to each via in the first pair of vias, wherein the first differential signal source is configured to generate the first differential signal pair conveyed by the first pair of vias (col. 2, lines 1-30) [claim 4], further comprising: a plurality of isolation vias (215), wherein the plurality of isolation vias substantially electromagnetically isolate the first pair of vias and the second pair of vias from a third pair of vias (shown not specifically referenced) and a fourth pair of vias (shown not specifically referenced) [claim 5], wherein the third pair of vias and the fourth pair of vias are each configured to convey a respective differential signal pair, the third pair of vias is positioned in a third plane, the third plane is substantially equidistant from each via comprised in the fourth pair of vias, the fourth pair of vias is positioned in a fourth plane, and the fourth plane is substantially equidistant from each via included in the third pair of vias [claim 6], wherein the first pair of vias is configured to convey a positive differential signal and a negative differential signal; the first pair of vias is positioned relative to the second pair of vias such that a crosstalk effect caused by the second signal pair on the positive differential signal reduces a crosstalk effect caused by the second signal pair of the negative differential signal (col. 2, lines 10-30) [claim 11], wherein the first pair of vias is positioned relative to the second pair of vias such that a crosstalk effect caused by the second signal pair on the positive differential signal substantially cancels a crosstalk effect caused by the second signal pair of the negative differential signal (col. 2, lines 10-30) [claim 12].

Additionally, Stoddard discloses, a method, comprising: conveying a first signal pair, wherein a first pair of vias (203) convey the first signal pair; and conveying a second signal pair, wherein a second pair of vias (205) convey the second signal pair, wherein the first pair of vias is positioned in a first plane, each point in the first plane is substantially equidistant from each via in the second pair of vias, the second pair of vias is positioned in a second plane, and each point in the second plane is substantially equidistant from each via in the first pair of vias [claim 20], wherein the first signal pair is a first differential signal pair, and the second signal pair is a second differential signal pair (col. 2, lines 1-30) [claim 21], a plurality of Ball Grid Array (BGA) connectors (col. 3, lines 5-10), wherein each via in the first pair of vias and the second pair of vias is coupled to a respective one of the plurality of BGA connectors [claim 22], conveying a third differential signal pair, wherein a third pair of vias (shown not specifically referenced), which extend through the substrate, convey the third differential signal pair; and conveying a fourth differential signal pair, wherein a fourth pair of vias (shown not specifically referenced), which extend through the substrate, convey the fourth differential signal pair, wherein the third pair of vias is positioned in a third plane, the third plane is substantially equidistant from each via in the fourth pair of vias, the fourth pair of vias is positioned in a fourth plane, and the fourth plane is substantially equidistant from each via in the third pair of vias [claim 23], wherein the first pair of vias and the second pair of vias are substantially electromagnetically isolated from the third pair of vias and the fourth pair of vias [claim 24].

Moreover, Stoddard discloses, a method, comprising: forming a first pair of vias (203) in a substrate (201), wherein the first pair of vias is positioned in a first plane; forming a second pair of vias (205) in the substrate, wherein the second pair of vias is positioned in a second plane; coupling the first pair of vias to receive a first signal pair; and coupling the second pair of vias to receive a second signal pair, wherein each point in the first plane is substantially equidistant from each via in the second pair of vias, and each point in the second plane is substantially equidistant from each via in the first pair of vias [claim 28], wherein the first signal pair is a first differential signal pair, and the second signal pair is a second differential signal pair (col. 2, lines 1-30) [claim 29], forming a third pair of vias (shown not specifically referenced) in the substrate, wherein the third pair of vias is positioned in a third plane; forming a fourth pair of vias (shown not specifically referenced) in the substrate, wherein the fourth pair of vias is located in a fourth plane; coupling the third pair of vias to receive a third differential signal pair; and coupling the fourth pair of vias to receive a fourth differential signal pair, wherein the third plane is substantially equidistant from each via in the fourth pair of vias, and the fourth plane is substantially equidistant from each via in the third pair of vias [claim 30], further comprising substantially electromagnetically isolating the first pair of vias and the second pair of vias from the third pair of vias and the fourth pair of vias [claim 31], wherein the substantially electromagnetically isolating comprises forming a plurality of isolation vias (215) in the substrate [claim 32], wherein the coupling the first pair of vias to receive the first differential signal pair comprises coupling the first pair of vias to a pair of Ball Grid Array (BGA) connectors (col. 3, lines 5-10) [claim 33], further

comprising: coupling a first differential signal source to the pair of BGA connectors (col. 2, lines 1-30) [claim 34].

Furthermore, Stoddard discloses, an integrated circuit, comprising: core circuitry (col. 2, lines 25-30) configured to process a first signal pair and a second signal pair; a first pair of leads (203) coupled to the core circuitry and configured to convey the first signal pair; and a second pair of leads (205) coupled to the core circuitry and configured to convey the second signal pair, wherein the first pair of leads is positioned in a first plane, each point in the first plane is substantially equidistant from each lead in the second pair of leads, the second pair of leads is positioned in a second plane, and each point in the second plane is substantially equidistant from each lead in the first pair of leads [claim 38], wherein the first signal pair is a first differential signal pair, and the second signal pair is a second differential signal pair (col. 2, lines 1-30) [claim 39].

In addition, Stoddard discloses, an apparatus, comprising: a substrate (201); means for conveying a first positive signal and means for conveying a first negative signal (203); means for conveying a second positive signal and means for conveying a second negative signal (205), wherein the means for conveying the first positive signal, the means for conveying the first negative signal, the means for conveying the second positive signal, and the means for conveying the second negative signal are located in the substrate, the first positive signal and the first negative signal are comprised in a first signal pair, the second positive signal and the second negative signal are

comprised in a second signal pair (col. 2, lines 1-30), the means for conveying the first positive signal and the means for conveying the first negative signal are positioned in a first plane, each point in the first plane is substantially equidistant from the means for conveying the second positive signal and the means for conveying the second negative signal, the means for conveying the second positive signal and the means for conveying the second negative signal are positioned in a second plane, and each point in the second plane is substantially equidistant from the means for conveying the first positive signal and the means for conveying the first negative signal [claim 40], wherein the first signal pair is a first differential signal pair, and the second signal pair is a second differential signal pair (col. 2, lines 1-30) [claim 41], further comprising: means for generating the first differential signal pair, wherein the means for generating are coupled to the means for conveying the first positive signal and to the means for conveying the first negative signal (col. 2, lines 1-30) [claim 42], wherein the means for conveying the first positive signal and the means for conveying the first negative signal are positioned relative to the means for conveying the second positive signal and the means for conveying the second negative signal such that a crosstalk effect caused by the first signal pair on the second positive signal reduces a crosstalk effect caused by the first signal pair on the second negative signal (col. 2, lines 10-30) [claim 43] the means for conveying the first positive signal and the means for conveying the first negative signal are positioned relative to the means for conveying the second positive signal and the means for conveying the second negative signal such that the crosstalk effect caused by the first signal pair on the second positive signal substantially cancels the crosstalk

effect caused by the first signal pair on the second negative signal (col. 2, lines 10-30) [claim 44].

Claims 14-18 are rejected under 35 U.S.C. 102(e) as being anticipated by US 2005/0077977 A1 (Beale).

Beale discloses, referring primarily to figures 3-4E, a printed circuit board, comprising: a substrate ([0034]) a first pair of vias (14, 18) in the substrate; and a second pair of vias (24, 28) in the substrate, wherein the first pair of vias is configured to convey a first signal pair comprising a first positive signal and a first negative signal ([0039]-[0048]), the second pair of vias is configured to convey a second signal pair comprising a second positive signal and a second negative signal ([0039]-[0048]), the first pair of vias is positioned relative to the second pair of vias such that a crosstalk effect caused by the first signal pair on the second positive signal reduces a crosstalk effect caused by the first signal pair on the second negative signal ([0039]-[0048]) [claim 14], wherein the second pair of vias is positioned relative to the first pair of vias such that a crosstalk effect caused by the second signal pair on the first positive signal reduces a crosstalk effect caused by the second signal pair on the first negative signal ([0039]-[0048]) [claim 15], wherein the first positive signal and the first negative signal are comprised in a first differential signal pair, and the second positive signal and the second negative signal are comprised in a second differential signal pair ([0039]-[0048]) [claim 16], wherein a skew of a first pair of traces is matched at a point at which the first pair of traces couples to the first pair of vias ([0013], [0019], figures 7, 8A-B) [claim 17],

wherein a skew of a second pair of traces is matched at a point at which the second pair of traces couples to the second pair of vias ([0013], [0019], figures 7, 8A-B) [claim 18].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7-10, 25, 26, and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stoddard in view of Beale.

Stoddard does not specifically state that a skew of a first pair of traces is matched at a point at which the first pair of traces couples to the first pair of vias [claims 7, 25, 35], wherein a skew of a second pair of traces is matched at a point at which the second pair of traces couples to the second pair of vias [claims 8, 26, 36], wherein the first pair of traces are routed on a same layer as the second pair of traces [claims 9, 37], wherein the first pair of traces are routed on an adjacent layer to the second pair of traces [claim 10]. However, Beale teaches, referring primarily to figures 3-4E, a first and second pair of vias wherein wherein a skew of a first pair of traces is matched at a point at which the first pair of traces couples to the first pair of vias ([0013]-[0019], figures 7, 8A, 8B), wherein a skew of a second pair of traces is matched at a point at which the second pair of traces couples to the second pair of vias ([0013]-[0019], figures 7, 8A, 8B), wherein the first pair of traces are routed on a same layer as the second pair of traces (figure 4A), wherein the first pair of traces are routed on an adjacent layer to the second pair of traces ([0060]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the arrangement taught by Beale in the invention of Stoddard. The motivation for doing so would have been to allow for efficient signal routing.

Claims 13 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stoddard.

Stoddard discloses the claimed invention as described above except Stoddard does not specifically state that in the conveying the first differential signal pair comprises conveying the first differential signal pair at a data rate greater than 250 megabits per second [claims 13, 27]. Instead, Stoddard generically teaches that the signals conveyed are "high-speed" (col. 1, lines 10-20). It is well known in the art that data rates greater than 250 megabits per second are "high speed" and are thus contemplated in the invention of Stoddard. Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to convey the first differential signal pair at a "high-speed" data rate greater than 250 megabits per second in the invention of Stoddard. The motivation for doing so would have been to allow for quick and efficient data transmission.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beale in view of US 2004/0150970 A1 (Lee) and US 6,008,534 (Fulcher).

Regarding claim 3, Beale discloses the claimed invention as described above except Beale does not specifically disclose a plurality of Ball Grid Array (BGA) connectors, wherein each via in the first pair of vias and the second pair of vias is coupled to a respective one of the plurality of BGA connectors [claim 19]. However, it is well known in the art to couple differential signal pair vias to connectors as evidenced by Lee (signal pads 22, figure 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to couple the via pairs in the invention of Beale to connectors as is known in the art and evidenced by Lee. The motivation for

doing so would have been to allow signal transmission between the invention and an external device. Additionally, it is well known in the art to form connectors as BGA connectors as evidenced by Fulcher (col. 2, lines 1-30). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form BGA connectors in the invention of Beale as is known in the art and evidenced by Fulcher. The motivation for doing so would have been to allow for communication with a BGA device, a popular mode of chip packaging in the art (Fulcher, col. 2, lines 1-30). Additionally, the modified invention of Beale teaches further comprising: coupling a first differential signal source to the pair of BGA connectors (Beale [0051]-[0052]) [claim 34].

Response to Arguments

Applicant's arguments filed 26 June 2006 have been fully considered but they are not persuasive. Regarding claims 14-19, Applicant alleges that the invention taught by Beale "requires four pairs of vias to obtain desired crosstalk reduction, rather than the simpler arrangement of two pairs of vias used by the claimed invention" (emphasis Applicants). However, Beale specifically states, "the amount or impact of crosstalk between signal lines 12 and 22 (at vias 14 and 24) is equal or substantially equal to the crosstalk between signal lines 12' and 22(') (at vias 20 and 26)". Thus, Beale teaches that a simple arrangement of two pairs of vias is sufficient to achieve the desired reduction in crosstalk. That Beale, *additionally*, couples a third and fourth pair of vias to the signal lines is independent from the crosstalk reduction resulting from the arrangement of the first and second pair of vias.

Applicant's arguments with respect to claims 1-13 and 20-44 have been considered but are moot in view of the new ground(s) of rejection.

Having addressed the relevant arguments regarding the instantly rejected claims Applicants traversal of the rejection on these grounds is deemed unsuccessful.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremy C. Norris whose telephone number is 571-272-1932. The examiner can normally be reached on Monday - Friday, 9:30 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on 571-272-1984. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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9/15/06